

Calculus Warm Up # 7- 3

Turn in the Salmon WS.

Sign out a scientific calculator for the quiz if you want one and don't have your own.
No graphers.

Take a ruler if you don't have your own.

Write HW Questions Here:

(They will be posted tonight)

21 + 23 #13
11 + 15

HW Questions: p. 203

In Exercises 2–6, find two positive numbers that satisfy the given requirements.

5. The second number is the reciprocal of the first and their sum is minimum.

6. The sum of the first and twice the second is 100 and the product is maximum.

In Exercises 9 and 10, find the length and width of a rectangle of minimum perimeter for the given area.

9. Area: 64 square feet



In Exercises 11 and 12, find the point on the graph of the function closest to the given point.

Function	Point
11. $f(x) = \sqrt{x}$	(4, 0)

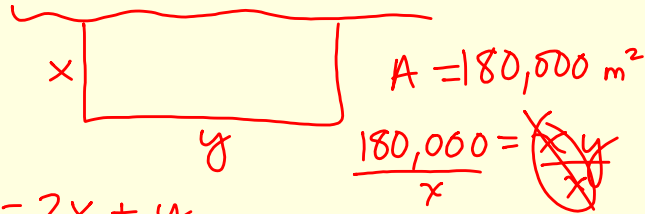
minimize distance
 $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
 primary equation.
 $d = \sqrt{(x-4)^2 + (y-0)^2}$
 $d = \sqrt{(x-4)^2 + (\sqrt{x})^2}$
 $d = \sqrt{x^2 - 7x + 16}$

$y = \sqrt{x}$ is secondary relationship

* Notice: minimum will be at smallest value under radical → let $g(x) = x^2 - 7x + 16$
 $g'(x) = 2x - 7$
 $0 = 2x - 7$
 $x = \frac{7}{2}$
 $\left(\frac{7}{2}, \sqrt{\frac{7}{2}}\right)$
 $\frac{\sqrt{14}}{2}$

confirm min 
 $g' \leftarrow \begin{array}{c} 0 \\ - \quad + \end{array} \begin{array}{c} 10 \\ 7 \\ 2 \end{array}$
 $g''(x) = 2$
 always + conc up 

13. A dairy farmer plans to fence in a rectangular pasture adjacent to a river. The pasture must contain 180,000 square meters in order to provide enough grass for the herd. What dimensions would require the least amount of fencing if no fencing is needed along the river?



$$F = 2x + y$$

$$F(x) = 2x + 180,000x^{-1} \quad \text{conf. min}$$

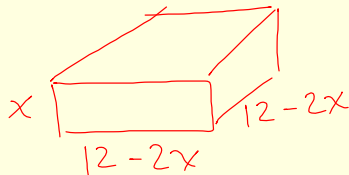
$$F'(x) = 2 - \frac{180,000}{x^2} \quad F'' = \frac{2(180,000)}{x^3}$$

$$0 =$$

$$x = 300$$



15. Just like our open box example:

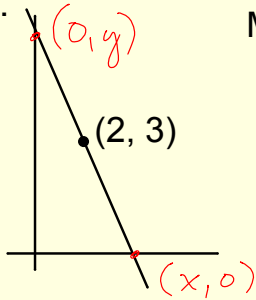


$$V = x(12-2x)^2$$

Easiest to simplify before you find the derivative.

Set $V' = 0$
find critical #'s
confirm Max

21.



Minimize area:

$$A = \frac{1}{2}bh$$

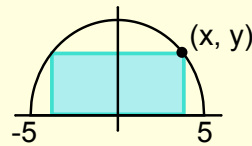
$$A = \frac{1}{2}xy$$

Use slope relationship
as a secondary eq.
so you can replace
one of the variables.

$$\frac{y-3}{0-2} = \frac{0-3}{x-2}$$

solve for y & replace

$$23. \quad y = \sqrt{25 - x^2}$$

Maximize area: $A = lw$ 

$$A = xy$$

$$A = x\sqrt{25 - x^2}$$

find A' , set = 0...

Group Quiz Time!

HW: Ch. 4 Review WS

Chapter 4 test next Tuesday